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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/995,575 | 11/29/2001 | Tamihide Yasumoto | 011317 | 1497 |

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EXAMINER

KIELIN, ERIK J

| ART UNIT | PAPER NUMBER |
|----------|--------------|
| 2813 | #4 |

DATE MAILED: 06/05/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|---|-------------------------|--------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 09/995,575 | YASUMOTO, TAMIHIDE |
| | Examiner Erik Kielin | Art Unit 2813 |
| -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address -- | | |
| <p>Period for Reply</p> <p>A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.</p> <ul style="list-style-type: none"> - Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication. - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely. - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication. - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). - Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b). | | |
| Status | | |
| <p>1)<input checked="" type="checkbox"/> Responsive to communication(s) filed on <u>11/29/01</u>.</p> <p>2a)<input type="checkbox"/> This action is FINAL. 2b)<input checked="" type="checkbox"/> This action is non-final.</p> <p>3)<input type="checkbox"/> Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under <i>Ex parte Quayle</i>, 1935 C.D. 11, 453 O.G. 213.</p> | | |
| Disposition of Claims | | |
| <p>4)<input checked="" type="checkbox"/> Claim(s) <u>1-8</u> is/are pending in the application.</p> <p>4a) Of the above claim(s) _____ is/are withdrawn from consideration.</p> <p>5)<input type="checkbox"/> Claim(s) _____ is/are allowed.</p> <p>6)<input checked="" type="checkbox"/> Claim(s) <u>1-8</u> is/are rejected.</p> <p>7)<input type="checkbox"/> Claim(s) _____ is/are objected to.</p> <p>8)<input type="checkbox"/> Claim(s) _____ are subject to restriction and/or election requirement.</p> | | |
| Application Papers | | |
| <p>9)<input checked="" type="checkbox"/> The specification is objected to by the Examiner.</p> <p>10)<input type="checkbox"/> The drawing(s) filed on _____ is/are: a)<input type="checkbox"/> accepted or b)<input type="checkbox"/> objected to by the Examiner.</p> <p style="margin-left: 20px;">Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).</p> <p>11)<input type="checkbox"/> The proposed drawing correction filed on _____ is: a)<input type="checkbox"/> approved b)<input type="checkbox"/> disapproved by the Examiner.</p> <p style="margin-left: 20px;">If approved, corrected drawings are required in reply to this Office action.</p> <p>12)<input type="checkbox"/> The oath or declaration is objected to by the Examiner.</p> | | |
| Priority under 35 U.S.C. §§ 119 and 120 | | |
| <p>13)<input checked="" type="checkbox"/> Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).</p> <p>a)<input checked="" type="checkbox"/> All b)<input type="checkbox"/> Some * c)<input type="checkbox"/> None of:</p> <ol style="list-style-type: none"> 1.<input checked="" type="checkbox"/> Certified copies of the priority documents have been received. 2.<input type="checkbox"/> Certified copies of the priority documents have been received in Application No. _____. 3.<input type="checkbox"/> Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)). <p>* See the attached detailed Office action for a list of the certified copies not received.</p> <p>14)<input type="checkbox"/> Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).</p> <p>a)<input type="checkbox"/> The translation of the foreign language provisional application has been received.</p> <p>15)<input type="checkbox"/> Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.</p> | | |
| Attachment(s) | | |
| <p>1)<input checked="" type="checkbox"/> Notice of References Cited (PTO-892)</p> <p>2)<input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</p> <p>3)<input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2</u>.</p> <p>4)<input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ .</p> <p>5)<input type="checkbox"/> Notice of Informal Patent Application (PTO-152)</p> <p>6)<input type="checkbox"/> Other: _____ .</p> | | |

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

2. The disclosure is objected to because of the following informalities:
 - in the Abstract, line 8, replace "the wiring of which thickness is thus reduced" with -- the thinned wiring-- for clarity;
 - on p. 2, lines 21-22, replace "the wiring of which thickness is thus reduced" with -- the thinned wiring-- for clarity;
 - on p. 3, line 4, replace "beginning an upper surface thereof up to a depth thereof" with -- beginning on an upper surface thereof down to a predetermined depth-- for clarity;
 - on p. 3, line 8, replace "the wiring of which thickness is thus reduced" with -- the thinned wiring-- for clarity; and
 - on p. 8, lines 14 and 19, and on p. 10, line 24, replace "titan" with --titanium-- for correct spelling.

Appropriate correction is required.

Claim Objections

3. Claims 1-8 are objected to because of the following informalities:
 - in claim 1, lines 12-13 of the claim, replace "the wiring of which thickness is thus reduced" with -- the thinned wiring-- for clarity;

in claim 3, lines 3-4 of the claim, replace "beginning an upper surface thereof up to a depth thereof" with --beginning on an upper surface thereof down to a predetermined depth-- for clarity;

in claim 5, lines 9-10 of the claim, replace "beginning an upper surface thereof up to a depth thereof" with --beginning on an upper surface thereof down to a predetermined depth-- for clarity; and

in claim 5, lines 14-15 of the claim, replace "the wiring of which thickness is thus reduced" with -- the thinned wiring-- for clarity.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

5. Claims 1-4 and 5-8 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6,255,179 B1 (**Cantell et al.**).

Regarding claims 1, 2, and 4, **Cantell** discloses a method of manufacturing a semiconductor device comprising,

forming a wiring comprising silicon on a surface of a semiconductor substrate (col. 5, lines 9-17);

covering part of the wiring with a resist pattern (col. 1, lines 27-38; col. 5, lines 14-15);

implanting ions into the wiring using the resist pattern as a mask (col. 1, lines 27-38; col. 5, lines 14-15);

removing the resist pattern (col. 1, lines 47-52);

removing a surface of the wiring to a depth of 10 to 200 Å (1 to 20 nm), more preferably 20-80 Å (2 to 8 nm) to remove the carbon contamination in the silicon wiring generated from “knocked-on carbon from the mask” during the implanting step (col. 4, lines 5-25; col. 5, lines 9-16); and

forming a metal silicide on a surface of the wiring by depositing cobalt or titanium metal on the silicon and then reacting the metal with the silicon by annealing (col. 4, lines 45 to col. 5, line 16).

Regarding claims 3, 5, 6, and 8, **Cantell** discloses a method of manufacturing a semiconductor device comprising,

forming a wiring comprising silicon on a surface of a semiconductor substrate (col. 5, lines 9-17);

covering part of the wiring with a resist pattern (col. 1, lines 27-38; col. 5, lines 14-15);

implanting ions into the wiring using the resist pattern as a mask (col. 1, lines 27-38; col. 5, lines 14-15);

removing the resist pattern (col. 1, lines 47-52);

oxidizing the wiring beginning on an upper surface thereof down to a depth of 10 to 200 Å, more preferably 15-30 Å and (col. 3, lines 55-57);

removing the oxidized portion of the wiring to remove the carbon contamination in the silicon wiring generated from “knocked-on carbon from the mask” during the implanting step (col. 4, lines 5-15; col. 5, lines 9-16); and

forming a metal silicide on a surface of the wiring by depositing cobalt or titanium metal on the silicon and then reacting the metal with the silicon by annealing (col. 4, lines 45 to col. 5, line 16).

Regarding claim 7, it is clear that the amount of the silicon oxidized is less than the depth, otherwise there would be no silicon wiring left, contrary to the teaching in **Cantell**.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Vines et al. US 6,007,641 teaches that it is known in the art to remove contaminants by oxidizing the silicon substrate and then removing the oxide with entrained contaminants. (See col. 2, lines 4-10; col. 3, lines 1-7.)

Nakanishi et al. US 5,504,022 teaches cleaning a silicon surface by oxidizing the silicon substrate and then removing the oxide. (See col. 3, lines 39-54.)

Kim et al. JP 11-145145 teaches etching back a polysilicon wiring prior to forming a metal silicide thereon. (See Abstract.)

Art Unit: 2813

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik Kielin whose telephone number is 703-306-5980. The examiner can normally be reached on 9:00 - 19:30 on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached at 703-306-2417. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Erik Kielin
May 23, 2002